## Space Weather Forecast

Issued on Wednesday, 07 June 2023 at 13:25 Local

**This forecast provides a four day assessment of space weather events. The probabilities stated below are for reaching or exceeding the given levels. For more information about space weather impacts please see the Met Office Space Weather Scales https://www.metoffice.gov.uk/weather/learn-about/space-weather/uk-scales**

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**Space Weather Forecast Headline: Chance of Moderate flares (R1/Minor-R2/Moderate radio blackouts). Slight chance of a G1/Minor Geomagnetic Storm 08/09 June.**

**Analysis of Space Weather Activity over past 24 hours**

**Solar Activity:** Solar activity has increased to Moderate levels with an ongoing flare at the time of writing from a fairly complex and large sunspot in the southeast. There are twelve sunspot regions on the visible disc, only two of which, both in the southern hemisphere, possess sufficient complexity for significant flares. One new region is emerging across the southeastern limb.

A Coronal Mass Ejection (CME) was observed leaving the sun around 07/0600 UTC near a sunspot in the southeast of the disc. Preliminary analysis suggests the CME is directed fully behind earth-orbit, however, further imagery is required to be able to confirm this. Otherwise no Earth-directed CMEs were observed in available imagery during the period.

**Solar Wind / Geomagnetic Activity:** Solar winds have largely been at background levels. Wind speeds were initially around 380-400km/s, but have reduced to around 320km/s by the end of the period. The total magnetic field has been weak, with the important north-south component, Bz, also varying weakly. Geomagnetic activity was Quiet (Kp 0-2).

**Energetic Particles / Solar Radiation:** The count rate of energetic particles (high energy protons) is at background levels with no solar radiation storms observed.

**Four-Day Space Weather Forecast Summary**

**Solar Activity:** Solar activity is expected to remain generally Low, but there remains a chance of further Moderate flares and a very slight chance of isolated Strong flares.

**Solar Wind / Geomagnetic Activity:** A filament lift-off starting around 04/0900UTC from the southwest produced a Coronal Mass Ejection (CME). A glancing blow at Earth is possible from this feature, although not guaranteed, most likely Day 2 (08 June) but possibly Day 3 (09 June). A second CME lifted off from close to the eastern limb around 06/0300UTC but is expected to miss, passing behind Earth on Day 4 (10 June). Solar winds are expected to remain at slow-ambient speeds initially. Perhaps seeing a slight enhancement Days 2-4 to slightly elevated levels given the potential for CME arrivals and a weak high-speed stream from one or perhaps two coronal holes moving into a more geo-effective position.

Geomagnetic activity is forecast to be initially Quiet to Unsettled, with a very slight chance of Active intervals on Day 1 (07 June). Activity may increase Days 2-4 with any CME or CH effects, becoming more Unsettled with a chance of Active intervals and a slight chance of isolated G1/Minor Geomagnetic Storm intervals.

**Energetic Particles / Solar Radiation:** The count rate of energetic particles (high energy protons) is expected to be at background levels. However, there is just a very slight chance of reaching the S1/Minor Storm threshold should any larger flares occur.

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**Geomagnetic Storms:**

| Geo-Magnetic Storm Probability (Exceedance) | Level | Past 24 Hours (Yes/No) | Day 1 (00-24 UTC) (%) | Day 2 (00-24 UTC) (%) | Day 3 (00-24 UTC) (%) | Day 4 (00-24 UTC) (%) |
|---|---|---|---|---|---|---|
| Minor or Moderate | G1 to G2 | No | 10 | 20 | 15 | 10 |
| Strong | G3 | No | 1 | 2 | 1 | 1 |
| Severe | G4 | No | 1 | 1 | 1 | 1 |
| Extreme | G5 | No | 1 | 1 | 1 | 1 |

**Radio Blackouts - X Ray Flares:**

| X Ray Flares Probability | Level | Past 24 Hours (Yes/No) | Day 1 (00-24 UTC) (%) | Day 2 (00-24 UTC) (%) | Day 3 (00-24 UTC) (%) | Day 4 (00-24 UTC) (%) |
|---|---|---|---|---|---|---|
| Active | R1-R2 M Class | Yes | 50 | 40 | 30 | 30 |
| Very Active | R3 to R5 X | No | 5 | 5 | 3 | 3 |

**Solar Radiation Storms - (High Energy Protons):**

| Radiation Storms Probability (Exceedance) | Level ($cm^{-2}$ $sr^{-1}$ $s^{-1}$) | Past 24 Hours (Yes/No) | Day 1 (00-24 UTC) (%) | Day 2 (00-24 UTC) (%) | Day 3 (00-24 UTC) (%) | Day 4 (00-24 UTC) (%) |
|---|---|---|---|---|---|---|
| Active | ≥ S1 | No | 5 | 5 | 5 | 5 |
| Very Active | ≥ S3 * | No | 1 | 1 | 1 | 1 |

* S3 ≥ 10 MeV ≥ 1000 pfu and / or ≥ 50 MeV ≥ 10 pfu. (pfu = $cm^{-2}sr^{-1}s^{-1}$)

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